Selected Papers Vol 1 : Stellar Structure and Stellar Atmospheres
by S Chandrasekhar
The University of Chicago Press : Chicago, USA, 1989
515 pages ; price : US $ 34·50 (Paper back) ; ISBN 0-226-10090-1

The present volume under review consists collection of scientific papers of S Chandrasekhar published during 1929-1945 in different journals and is the first of a projected series of five or six volumes proposed to be published within a few years. The criteria for the selection of the papers for publication in the present form are essentially two fold. First, the papers selected for the volume have not been included in any of the published books of the authors and second the papers treat only matters of possible historical interest not treated in sufficient detail elsewhere.

The papers included in the present volume are grouped into five sections. The first section consists of papers of the theory of white dwarfs. The implications of these papers for the problems of stellar evolution and the controversy arose with Eddington have been discussed. The interest of the author on the possible role of electron degeneracy to the structure of white dwarf stars was stimulated from his meeting with Arnold sommerfeld during the later's visit to Madras in the late fall of 1928.

The second section consists of papers on the equilibrium of distorted polytropes based on author's work for the PhD thesis submitted to Cambridge and also for a thesis, submitted for a fellowship at Trinity College. The original idea for these investigations came from an early paper of F A Milne. These papers were written from December 1932 to May 1933 during the authors stay in Copenhagen at the Institute for Theoretical Physics.

The section three of the present volume consists of the author's published papers on Steller evolutions. These papers were written after the author's published "Introduction to the study of stellar structure".

Section four consists of seven papers published by the author on Integral theorems on the Equilibrium of a star. Author's interest on integral theorems was stimulated by some correspondence he had with Milne. Eddington had shown earlier that the pressure at the centre of a star must exceed the value it would have, were the star homogeneous. The converse of this theorem leads to some far reaching conclusions ; in particular that massive stars with radiation pressures exceeding 10 per cent of the total pressure cannot have degenerate cores - a conclusion contrary to Milne's that "All stars must have degenerate cores". Milne concluded that the converse of Eddington's theorem must be false.

The last section of the present volume consists of eight published papers of the author on theory of stellar atmosphere. The authors interest in this area originated mainly due to his association and discussion with F A Milne and V Ambertsumian. In this volume I of the series there are altogether 44 papers of the author. A complete list of publications by the author is expected to appear at the final volume of the series.

All the papers presented in the volume are of very high quality and reflect the original thinking of the author. This valuable and painstakingly produced volume contains a wealth of information of various aspects of Stellar structure and Stellar atmosphere. The utility of this volume is not limited to these specialized area only. It will have a general interest to all theoretical physicists and will serve an excellent reference book to all engaged in the research in Astrophysics and allied subjects.

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LICHENS (a Preliminary Text)
by Arun Kumar Misra and Raghavendra Prasad Agrawal
Oxford & IBH Publishing Co : New Delhi-Bombay-Calcutta, 1978
103 pages ; price : Rs. 25·00

Lichens represents a unique synthesis of nature being made up of a fungal partner (Mycobiont) and an alfal partner (Phycobiont) living together in perfect harmony and in a sort of peaceful coexistence in the biological world, tailored to colonize and adapting themselves often to extreme habitats, which no other plants can match. Unfortunately, this group of plants have not received the attention of scientists to the extent they deserved in our country. There are only a handful of lichenologists in India despite the fact that this group can be very successfully exploited both from the view of its economic importance and as a biological agent in monitoring air-pollution.

It is of interest that a very handy, compact, illustrated book 'Lichens' (a preliminary text) written by A K Misra and R P Agrawal published by Oxford & IBH has been made available to the students and teachers alike. In this small book of 103 pages, the authors have covered 11 Chapters, besides a list of taxonomic index, author index and subject index.

In the 1st Chapter, the readers are introduced to the subject regarding lichen. In Chapter 2, the historical aspect was covered including a very useful review of

works done so far in India by different lichenologists starting from Acharions' work 'Lichenograph a Universalis' (1810) to the present time. The 3rd Chapter deals with classification. It would have been very useful, if examples from Indian material (Genus and Species) could be incorporated under different groups—for example under Basidiolichen. Chapter 4 is devoted to distribution of lichens which is adequately covered. Chapter 5 is devoted to external and internal morphology of lichen thallus in a lucid manner and various structures associated with lichen thallus received a fair treatment. Chapter 6 on reproduction provided a concise account of lichen reproduction by various means. Chapter 7 took care of lichen physiology—a chapter of immense value, which is likely to pane the way some day of successful lichen culture in the laboratory with precise know-how by mixing the Phycobiont and Mycobiont growing separately—a challenging task of the lichenologists for a long period of time. Chapter 10 is thus confined to this possibility of lichen 'synthesis'. 'Ecology' is the subject of Chapter 11, which has been well written for which the authors deserve special mention. Finally the Chapter 11 deals with the various economic uses of lichens as a source of food, field, pharmaceuticals, dyestuffs, perfumes etc. The harmful effects of lichens have also been briefly reviewed. There are 9 tables at the end of the book which may immensely benefit many scientists for in a concise manner, it has assembled widely diverging data of contemporary interest (like growth rates of some lichen species, names of lichens used in air pollution studies, data on lichen chemistry. Lichen chemistry and use of lichen in monitoring air-pollution are the only two subjects which should be incorporated in further details in future editions of the book, because both the subjects are not only highly interesting but will engage the attention of lichenologists more in the years to come.

The price of the book is a bit high but when one considers the price of recently published books on the same subject by foreign authors (eq. Hale), certainly the price of this book is moderate and reasonable. In a nut-shell, the facts brought together on 'Lichens' is praiseworthy and I recommend the book to the students and teachers of the undergraduate Pass and Honours course of Indian Universities.

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Ultrafast Phenomenon IV (Springer Series in Chemical Physics, Vol 38)
(Proceedings of the Fourth International Conference, Monterey, California, June 11-15, 1984)
edited by D H Auston and K B Eisenthal
Springer-Verlag : Berlin-Heidelberg-New York, 1984
509 pages, 370 figures ; price ; US $ 31·30 (Hard cover) ; ISBN 3-540-13834-x

Last decade has witnessed fast, if not ultrafast, development of generation and application of short optical pulses obtainable from lasers. The pulse-width have now been pushed to six femtoseconds, the measurements have been made more precise and trustworthy, and there is hardly any area in Physics, Chemistry and Biology where kineticists have not made use of this newly available sophisticated trigger. This 509-page report on the proceedings of the fourth international conference held at Monterey, California between June 11 and 15, 1984 bear testimony to the enthusiasm and ingenuity of scientists and to the high-quality of research conducted in this area since the last topical meeting at Hilton Head Island in 1978. Springer-Verlag is indeed doing a great service to the cause of science by bringing out these volumes for the benefit of those who did not have the opportunity of attending the meeting.

The volume covers following topics :

Part I discusses generation and measurement techniques (30 papers), Part II solid state physics and non-linear optics (29 papers), Part III coherent pulse propagation (8 papers), Part IV stimulated scattering (8 papers), Part V transient, laser photochemistry (12 papers), Part VI molecular energy redistribution, transfer and relaxation (17 papers), Part VII electronics and opto-electronics (14 papers) and Part VIII photochemistry and photophysics of biological systems (17 papers). The above list amply demonstrates the breadth of the area and properly emphasizes the current trend. Almost all the leading scientists from all over the world have contributed and the state-of-art (as of 1984) presented. The volume will be immense value to persons actually working on pico- and famto-second processes ; the results will interest persons working in related fields.

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Surface Enhanced Raman Vibrational Studies at Solid/Gas Interfaces
(Springer Tracts in Modern Physics, Vol 104)
edited by I Pockrand
Springer-Verlag : Berlin-Heidelberg-New York, 1984
164 pages, 60 figures ; price : US $ 28·40 (cloth) ; ISBN 3-540-13416-6

In recent years, there has been a tremendous interest to understand the physics and chemistry of surfaces ranging from the fundamental interest in two dimensional physics and chemistry to the more applied interest in the surfaces used in semiconductor industry or catalysis. A number of new techniques have been discovered over the last decade surface enhanced Raman scattering (SERS) is one of them. It was first reported in 1977, when two groups independently observed an exceedingly large enhancement ($10^5 - 10^6$) of Raman cross section of pyridine on specially prepared silver electrodes. Since then this has been developed into a very powerful tool to study the vibrational spectroscopy of adsorbed species. Simultaneously, a number of mechanisms have been proposed to explain this enhancement. The present book reviews the experimental and theoretical works in this field which were reported before the Spring 1984. The main aim of author has been to emphasize the importance of SERS as a surface analytical tool and on the interpretation of SER data. The discussions on the theoretical works is brief, though list of references is exhaustive.

The organization of the book is as follows. After a brief introduction to the phenomena the author outlined the basic principles in the second chapter and the experimental techniques in the third. In the following six chapters SER data of pyridine, hydrocarbon, carbon monoxide, oxygen, water and some miscellaneous systems have been discussed in some detail. Chapter 10 discusses selected applications in some other surface phenomena and a few relevant surface enhanced processes. Finally a summary and an outlook for future work has been presented.

Considering the vigorous activities in the applications of linear and nonlinear optical techniques in surface science it is hard to predict how long this slender volume will be considered upto-date. However, for the research workers in this field, this book will definitely be a very useful source of references (altogether 936). For a beginner interested in the spectroscopy of adsorbed species this book will continue to be a nice introductory text even after being overtaken by a more elaborate volume.

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Short Wavelength Lasers and Their Applications (Springer Proceedings in Physics, Vol 30)

(Proceedings of an International Symposia, Osaka, Japan, November 11-13, 1987)
edited by C Yamanaka

Springer-Verlag : Berlin-Heidelberg-New York-London-Paris-Tokyo-Hong Kong, 1988
xiv + 410 pages, 374 figures ; price : DM 104 (Hard cover) ; ISBN 3-540-50311-0

The book under review records the proceedings of the international symposium on short wavelength lasers and their applications held in Japan, November 1987. The papers presented have been classified in six major sections dealing with X-ray lasers, free electron lasers and synchroton radiation, excimer lasers, short wavelength radiation in laser fusion and other applications along with an introductory section.

Since short wavelength lasers have found a wide area of applications in material processing, X-ray lithography, photochemistry, isotope separation, nuclear fusion, DNA research, etc. recent years have witnessed a tremendous upsurge in the development of technology of these lasers. In the section for X-ray lasers new X-ray lasing at 6.6 nm and 7.1 nm in Eu-ions and novel results on X-ray holography have been reported. Interesting X-ray resonator concept has been developed. Short wavelength free electron lasers (FEL) operating at 10-200 nm developed at Stanford and a two-stage FEL using a 6 MeV accelerator have been reported. Because of high power output and pulse compression leading to pico and sub-pico second pulse width, excimer lasers have been very useful in studying time-dependent fast processes. A number of such laser systems have been described. On the application side major emphasis has been given on fusion, fifteen papers are directly related to this problem. Some results on neutron yield are comparable to Takamak results. Other areas of application include holography, isotope separation etc.

This is a well-edited volume in the Springer Proceedings series. We hope that although somewhat specialized in nature the book will be useful for updating our knowledge of recent development in the field of short wavelength lasers not only for the persons actively concerned but also for those engaged in energy research, in general.

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